# CABLE AND FAULT LOCATING MANUAL

## MODEL 8830

RYCOM®
instruments, inc.

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# SECTION 1

# GENERAL INFORMATION

## INTRODUCTION

The Rycom Model 8830 Cable Fault Locator is a lightweight portable fault and path locating system. It will help you locate:

- Ground and sheath faults in buried cables
- Path and depth of buried cables and pipes
- Aerial cable faults
- Some shorts, crosses, splits, opens and conductor-to-sheath grounds

The complete 8830 fault locating system consists of the following parts:

1. Transmitter
2. Receiver
3. Ground Return Probe
4. Snooper Probe
5. Carrying Case for Snooper and Ground Return Probes (optional)
6. Flexicoupler
7. Headset
8. Ground Rod
9. Red/Black Test Cord
10. Yellow Test Cord
11. Coiled Cord

The transmitter tracing tone is connected to the cable or pipe being tested with the test cords or flexicoupler. The receiver, with its meter and speaker outputs, shows you the location of the cables, pipes and faults by the amount of trace tone signal picked up by the snooper and ground return probe as they are moved along or across the path of the cable or pipe being tested.

The NULL (minimum amount of trace tone picked up by a probe) is used to show you the location and depth of the cable or pipe. The PEAK (maximum amount of trace tone picked up by a probe) is used along with the NULL to locate faults in cables.

IF YOU HAVE PROBLEMS AND NEED SOME HELP, CONTACT:

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Raytown, Missouri 64133 U.S.A.
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Answbk: "Rycominstr"

If you think a fault locating practice field would help improve your locating skills, contact RYCOM INSTRUMENTS. We will give you the details on how to build a practice field.

## WHAT THE RYCOM 8830 FAULT LOCATOR EQUIPMENT DOES

1. TRANSMITTER. Produces the tracing tone that is coupled to the cable or pipe being tested.

2. GROUND ROD. Connects the red/black or yellow test cord to earth ground.

3. RED/BLACK TEST CORD. Connects the transmitter tracing tone to the cable or pipe being tested.

4. YELLOW TEST CORD. Connects the transmitter capacitor loading output to the cable fault being tested.

**SHOCK HAZARD**

Connect the test cords or flexicoupler to the cable or pipe before turning ON the transmitter. BE CAREFUL. Don't handle the clips on the end of the red/black or yellow test cord when the transmitter is turned ON, or you may be shocked. Voltages across the test cords can reach up to 200 volts peak AC. Special care should be exercised under HIGH MOISTURE CONDITIONS. A shock under moist conditions could cause injury.

5. FLEXICOUPLER. Inductively couples the transmitter tracing tone to the cable or pipe being tested. It will loop around a cable or pipe 4 inches or less in diameter.

6. SNOOPER PROBE. Inductively picks up the trace tone from the cable or pipe, locating path, depth and faults.

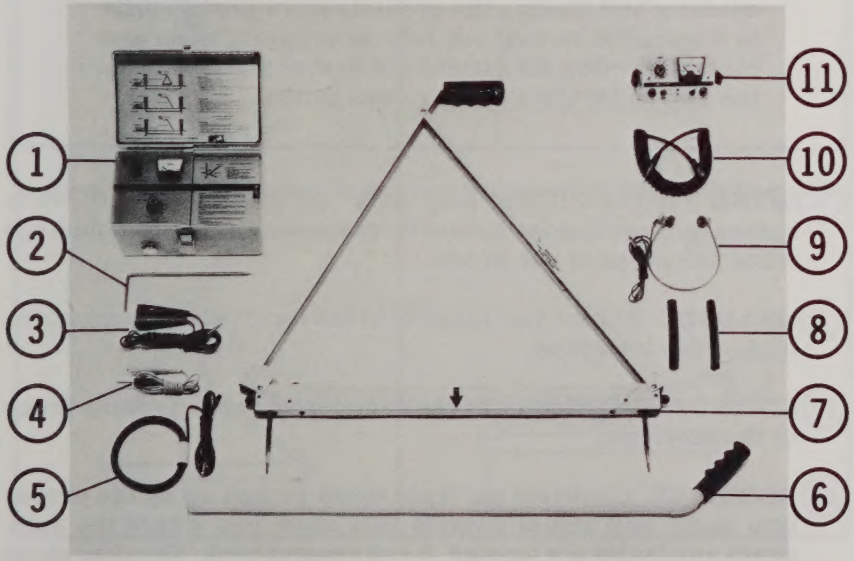



**Figure 1-1. Equipment and Accessories**

7. GROUND RETURN PROBE. Picks up the trace tone by direct contact with the ground, locating ground and sheath faults in buried cable.

**CAUTION**

Keep your fingers clear of the folding parts when opening and closing the ground return probe. Refer to Figure 1-2 to find out how to properly open and close the probe. Be careful not to stab yourself with the spikes on the ground return probe.

8. SPIKE PROTECTORS. Slip over the ground return probe spikes, preventing the spikes from causing accidental damage when the probe is not in use.

9. HEADSET. Allows you to listen to the receiver audio output in high noise locations.

10. COILED CORD. Connects the snooper or ground return probe to the receiver.

11. RECEIVER. Converts the trace tones picked up by the probes into audio and visual outputs that show you where the path, depth and faults are located. A convenient neck/shoulder strap provides for hands-free operation.

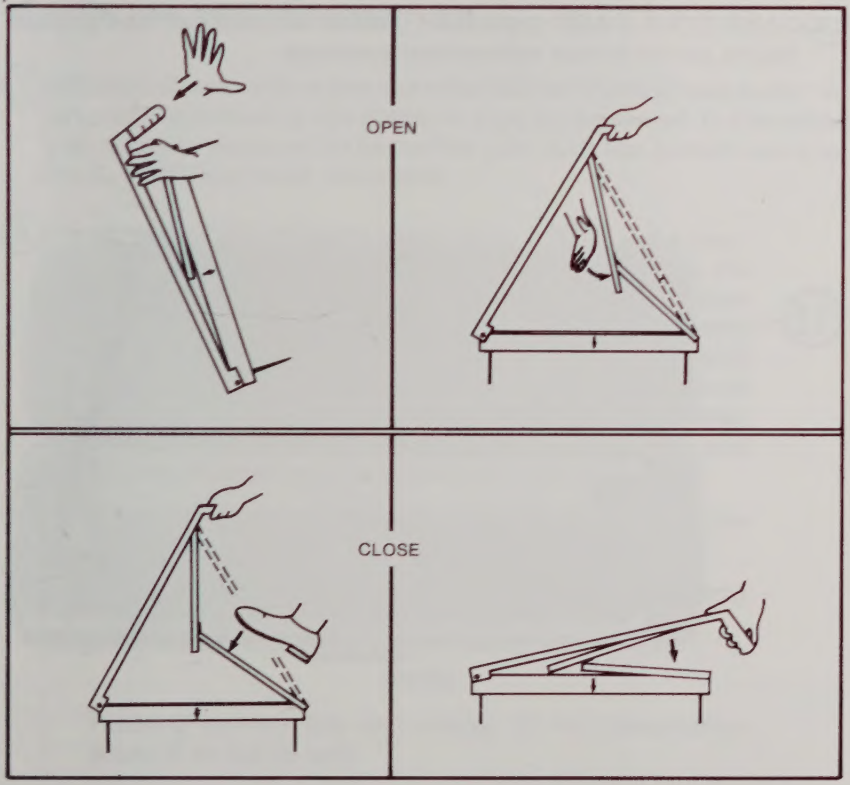



**Figure 1-2. How to Open and Close the Ground Return Probe**

(12.) CARRYING CASE (optional). Holds the snooper and ground return probe in one convenient package.

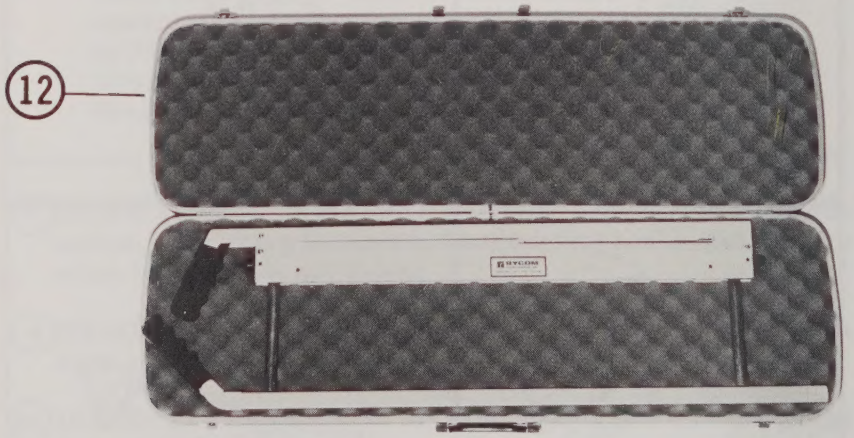



**Figure 1-3. Carrying Case**

## HOW TO USE THE TRANSMITTER

1. METER. Shows you when the transmitter tracing tone power is properly matched to the cable or pipe being tested. It also tells you when to replace the batteries; just turn the control knob to BAT. TEST and read the meter.

2. TRANSMITTER POWER CONTROL KNOB. Lets you:
   - Match the transmitter tracing tone power to the cable or pipe being tested in order to get the best accuracy and distance out of your instrument. Simply turn the control knob until the meter reads in the GREEN. Whenever the meter does not read in the green (high or low resistance cable paths), adjust the control knob so that both the meter and control knob read in position 1 or 5.
   - Test the batteries. Turn the control knob to the BAT. TEST position and read the meter.
   - Turn off the transmitter by placing the control knob in the OFF position.

**NOTE**

Prolong battery life by turning off the transmitter when it is not in use.

3. RED/BLACK TEST CORD JACK. Connects the transmitter tracing tone to the cable or pipe being tested. Note that the transmitter will not turn ON until either the red/black test cord or flexicoupler is plugged into this jack.

4. YELLOW TEST CORD JACK. Connects the transmitter capacitor loading output to the cable being tested when the yellow test cord is plugged into this jack.

5. FUSE. Helps to protect the transmitter from accidental hook up to a cable carrying power or foreign EMF's. Test the fuse as follows:

   a. Plug the red/black test cord into the transmitter and connect (short) the red and black leads together.

   b. Turn the control knob to position 5.

   c. FUSE is OK if the meter reads in position 1.

   d. REPLACE FUSE if the meter reads in position 5. Use a regular 3AG 1.5 amp 250 volt fuse.

6. STORAGE COMPARTMENT. The receiver is stored in the right side (largest compartment). The flexicoupler, headset, coiled cord, red/black test cord and yellow test cord are stored in the left side. The ground rod is stored in the front section of both compartments.

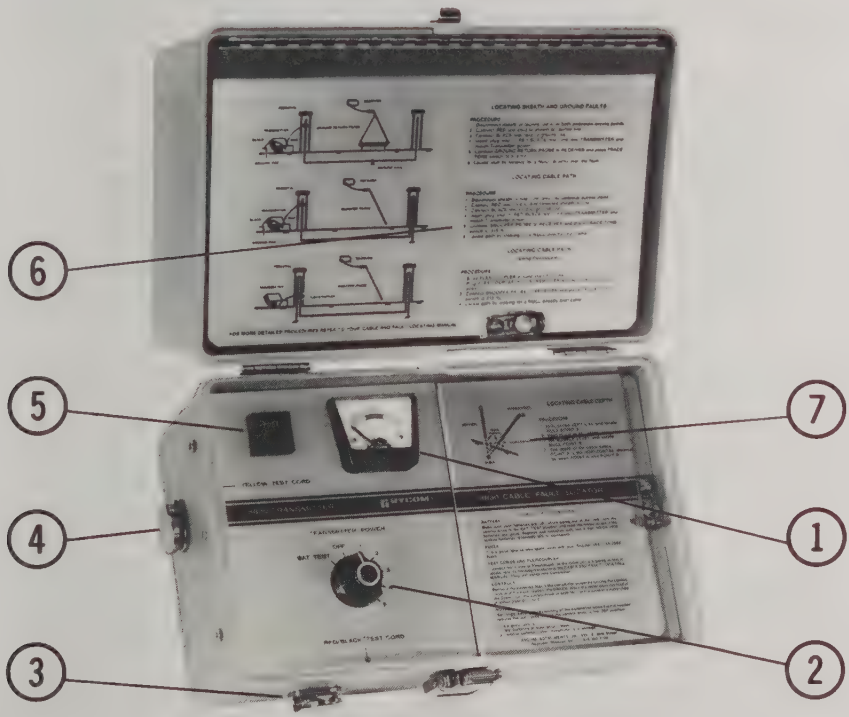



**Figure 1-4. Transmitter Features**

7. BATTERY COMPARTMENT. Holds two 6 volt NEDA #908 lantern batteries (Eveready 509 or equivalent).

**NOTE**

Always make sure your batteries are okay before going out in the field. Test the batteries at least once a week when you are not using the transmitter. Remove the batteries when the transmitter is in storage. Do not leave bad batteries in the battery compartment; they may leak and cause damage.

## HOW TO USE THE RECEIVER

1. METER. The meter does three things for you:

   a. It shows you the PEAKS and NULLS while you use the probes to locate the cable or pipe being tested. The largest meter pointer movements to the left are called NULLS. The largest pointer movements to the right are called PEAKS.

   b. It has a scale that is numbered from 0 to 10. While you are fault locating, the PEAK reading (between 0 and 10) will suddenly change in value as you pass over the fault.

   c. It tells you when to replace the batteries. Simply press the BAT. TEST switch and read the meter.

2. GAIN CONTROL KNOB. Adjust the gain control knob so the meter will indicate the PEAKS and NULLS when you use your probes to locate the cable or pipe being tested.

3. PROBE JACK. Plug the coiled cord into the probe jack to turn the receiver ON. Connect the snooper or ground return probe to the other end of the coiled cord.

**NOTE**

Get longer battery life by turning off the receiver when it is not in use.

4. TRACE TONE SWITCH. Flip to the 815 Hz position when you use the 8830 transmitter as the trace tone source. Trace energized power cable by flipping the switch to the 50-60 Hz position. Note that no transmitter hookup is required when tracing energized cable.

5. SPEAKER. Listen to the audio PEAKS and NULLS when you use the receiver. The speaker produces an audio tone related to the meter reading (0 to 10). When the meter reading rises, the pitch of the audio tone rises. When the meter reading falls, the pitch of the audio tone falls. The lowest pitched tones are called NULLS. The highest pitched tones are called PEAKS.

6. BAT. TEST SWITCH. Test the batteries by pressing the BAT. TEST switch and reading the meter. Replace the batteries as follows:

   a. Remove the 2 battery access screws (see Figure 1-5).

   b. Remove the receiver cover.

   c. Replace the four "C" cell size batteries in the battery holder.

7. HEADSET JACK. The speaker is turned OFF when you use the headset.

8. VOLUME ADJUST FOR SPEAKER & HEADSET. Remove battery access screws and receiver cover. Adjust pots to desired level.

**Figure 1-5. Receiver Features**

# SECTION 2

# LOCATING PATH AND DEPTH

The Model 8830 Cable Fault Locator will easily locate the path and depth of buried or underground cables and pipes.

The same transmitter and receiver hookups are used for locating both path and depth. The transmitter tracing tone is coupled to the cable or pipe by either the red/black test cord (direct) or the flexicoupler (inductive). The snooper probe picks up the trace tone and couples it to the receiver. The receiver changes the trace tone into audio (speaker) and visual (meter) outputs that show you the location of the path and depth of the cable or pipe.

## HOW TO HOOK UP THE TRANSMITTER

The following hookup diagrams and procedures explain how to connect the transmitter to most cables or pipes.

**NOTE**

Always place the transmitter and ground rod (when used) as far away from the cable or pipe as possible.

**NOTE**

When a ground rod is required in the hookup, make sure you have a solid ground connection. In some soil conditions, such as sandy or dry ground, in order to get a good ground connection it may be necessary to use a longer ground rod than the one supplied with the 8830 Cable Fault Locator.

**NOTE**

When you hook up the transmitter to an indoor access point, in order to locate an outdoor cable sheath or pipe, you may run into a problem with distributed common grounding that will prevent the transmitter tracing tone from reaching the outdoor runs. If you cannot adequately trace the tone outside, you may need to connect a separate ground wire between the transmitter and an outside ground rod connection.

## SHORT CABLE RUNS USING THE FLEXICOUPLER

PROCEDURE

(Using Sheath)

1. Ground the sheath at the near and far access points (common bond grounding or ground rods may be used).

2. Loop the flexicoupler around the sheath at the near access point and fasten tightly together the two ends of the flexicoupler.

(Using Conductor)

1. Isolate and ground **(with ground rods)** the same conductor at the near and far access points.

2. Loop the flexicoupler around the conductor at the near access point and fasten tightly together the two ends of the flexicoupler.

3. Plug the jack end of the flexicoupler cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 2-1).

4. Check the transmitter batteries by turning the control knob to the BAT. TEST position and reading the meter. Replace bad batteries.

5. Turn the transmitter control knob to position 1.

6. Hook up the snooper probe to the receiver. Refer to Section 2, page 28, HOW TO HOOK UP THE RECEIVER.

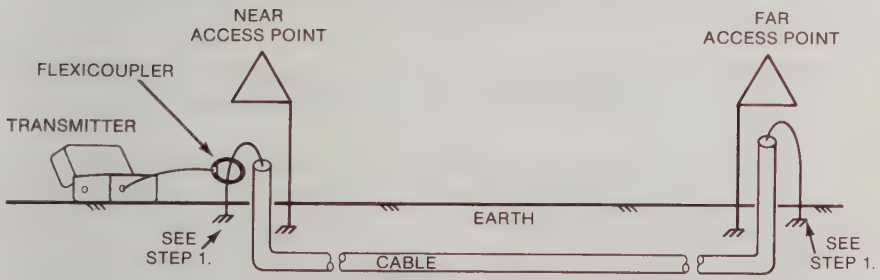



**Figure 2-1.**

**SHORT CABLE RUNS USING DIRECT CONNECTION (up to 3,000 feet)**

PROCEDURE

| (Using Sheath) | (Using Conductor) |
|---|---|
| 1. Ground the sheath at the far access point (common bond grounding or ground rod may be used). | 1. Isolate and ground **(with ground rod)** the conductor at the far access point. |
| 2. Disconnect the sheath at the near access point. | 2. Disconnect the conductor at the near access point. |
| 3. Connect the red test cord clip to the sheath at the near access point. | 3. Connect the red test cord clip to the conductor at the near access point. |

4. Connect the black test cord clip to the ground rod (see Figure 2-2).

5. Plug the jack end of the red/black test cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 2-2).

6. Check the transmitter batteries by turning the control knob to the BAT. TEST position and reading the meter. Replace bad batteries.

7. Match the transmitter tracing tone to the cable by turning the control knob until the meter reads in the GREEN. If the meter will not read in the GREEN, adjust the control knob so that both the meter and control knob read in position 1 or 5.

8. Hook up the snooper probe to the receiver. Refer to Section 2, page 28, HOW TO HOOK UP THE RECEIVER.

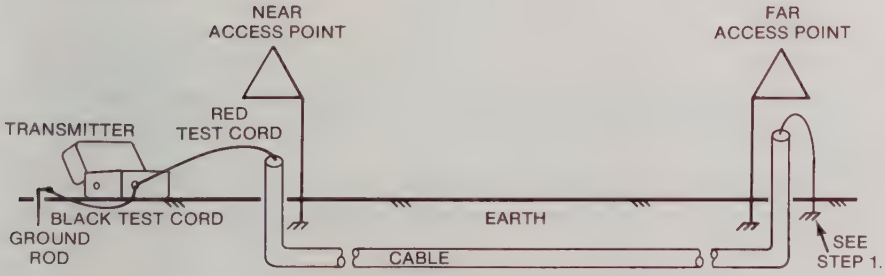



**Figure 2-2.**

## LONG CABLE RUNS USING DIRECT CONNECTION (up to 25 miles)

PROCEDURE

1. Isolate the conductor at the far access point and **ground it with a ground rod.**

2. Disconnect the conductor at the near access point.

3. Connect the red test cord clip to the conductor at the near access point.

4. Connect the black test cord clip to the ground rod (see Figure 2-3).

5. Plug the jack end of the red/black test cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 2-3).

6. Check the transmitter batteries by turning the control knob to the BAT. TEST position and reading the meter. Replace bad batteries.

7. Match the transmitter tracing tone to the cable by turning the control knob until the meter reads in the GREEN. If the meter will not read in the GREEN, adjust the control knob so that both the meter and control knob read in position 1 or 5.

8. Hook up the snooper probe to the receiver. Refer to Section 2, page 28, HOW TO HOOK UP THE RECEIVER.

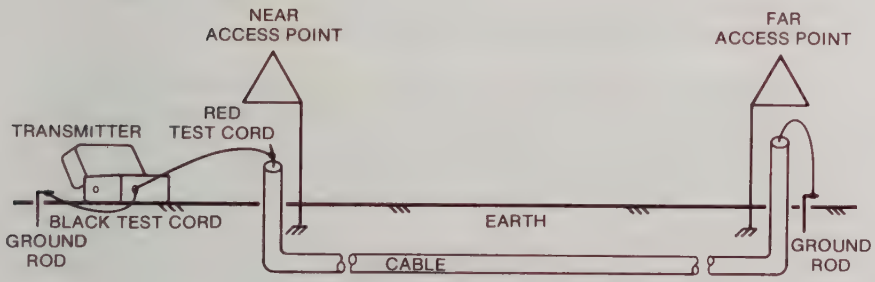



**Figure 2-3.**

## LOCATING A PIPE USING THE FLEXICOUPLER

PROCEDURE

1. If the pipe is non-metallic, run a sewer snake or wire through the pipe and ground both ends.

2. If the pipe is metallic but does not make a good continuous ground along its length, you will need to ground both ends of the pipe.

3. Loop the flexicoupler around the pipe and fasten tightly together the two ends of the flexicoupler.

4. Plug the jack end of the flexicoupler cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 2-4).

5. Check the transmitter batteries by turning the control knob to the BAT. TEST position and reading the meter. Replace bad batteries.

6. Turn the transmitter control knob to position 1.

7. Hook up the snooper probe to the receiver. Refer to Section 2, page 28, HOW TO HOOK UP THE RECEIVER.

**NOTE**

When dielectric (insulated) unions have been used to join metallic pipe sections, be sure to hook up the transmitter to the exact pipe section you wish to locate. Other sections of the pipe may not carry the transmitter tracing tone beyond the union. A pipe cannot be located unless it has the tracing tone on it.

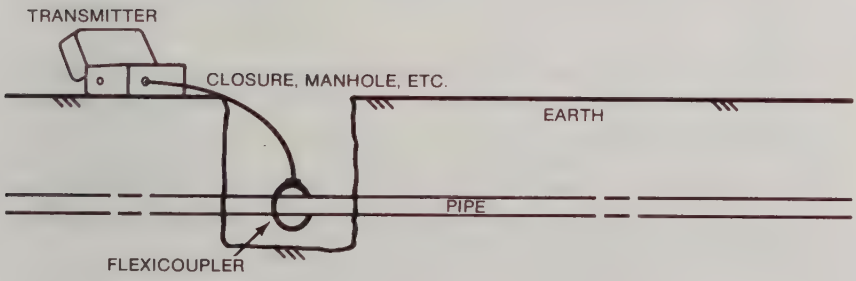



**Figure 2-4.**

## LOCATING A PIPE USING DIRECT CONNECTION

PROCEDURE

1. If the pipe is non-metallic, run a sewer snake or wire through the pipe and ground the far end.

2. If the pipe is metallic but does not make a good continuous ground along its length, ground the far end of the pipe.

3. Connect the red test cord clip to the near end of the pipe, snake or wire.

4. Connect the black test cord clip to the ground rod (see Figure 2-5).

5. Plug the jack end of the red/black test cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 2-5).

6. Check the transmitter batteries by turning the control knob to the BAT. TEST position and reading the meter. Replace bad batteries.

7. Match the transmitter tracing tone to the pipe by turning the control knob until the meter reads in the GREEN. If the meter will not read in the GREEN, adjust the control knob so that both the meter and control knob read in position 1 or 5.

8. Hook up the snooper probe to the receiver. Refer to Section 2, page 28, HOW TO HOOK UP THE RECEIVER.

**NOTE**

When dielectric (insulated) unions have been used to join metallic pipe sections, be sure to hook up the transmitter to the exact pipe section you wish to locate. Other sections of the pipe may not carry the transmitter tracing tone beyond the union. A pipe cannot be located unless it has the tracing tone on it.

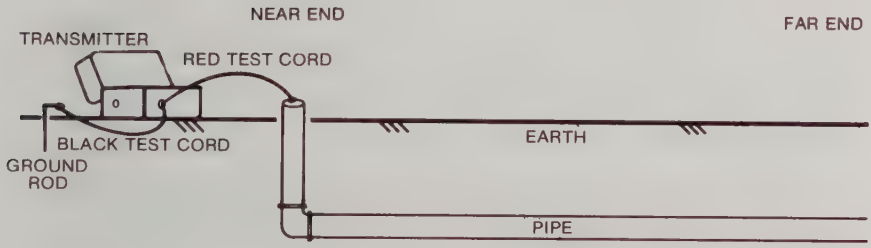



**Figure 2-5.**

## HOW TO HOOK UP THE RECEIVER

PROCEDURE

1. Check the receiver batteries by pressing the BAT. TEST switch and reading the meter. Replace bad batteries.

2. Plug one end of the coiled cord into the snooper probe jack receptacle.

3. Plug the other end of the coiled cord into the PROBE jack receptacle on the receiver. This will turn on the receiver.

4. Flip the TRACE TONE switch to the 815 Hz position.

## HOW TO TRACE THE PATH

PROCEDURE

1. Hook up the transmitter to the cable or pipe you are going to trace (see Section 2, page 17, HOW TO HOOK UP THE TRANSMITTER).

2. Hook up the receiver to the snooper probe (see Section 2, page 28, HOW TO HOOK UP THE RECEIVER).

3. Move about 10 feet from the near end access point along the path and swing the snooper probe across the path (see Figure 2-6a). When the snooper probe is directly above the cable or pipe, a NULL (lowest meter reading and lowest pitched tone on the receiver) will occur. When you swing the snooper probe to the left or right of the NULL point, the meter reading and pitch of the tone on the receiver will both rise until a maximum point is reached (PEAK). When the snooper probe is swung beyond the PEAK, the meter reading and pitch of the tone will begin to fade.

4. With the snooper probe located at its PEAK position to the left or right of the NULL point, turn the GAIN control knob on the receiver until the meter reads 8.

5. Trace the path by moving toward the far end of the cable or pipe and following the NULL indications as the snooper probe is swung back and forth (see Figure 2-6b).

When you trace the path, the PEAK level may slowly fade as you move away from the transmitter. Readjust the GAIN control knob, as possible, to maintain a PEAK meter reading of 8. If the PEAK meter reading suddenly changes in level (higher or lower), you may have passed a cable ground fault, discovered a change in depth of the cable or pipe or passed a dielectric union in the pipe. If the PEAK meter reading fades so low that the GAIN control knob no longer can be readjusted so that you can see or hear the difference between the PEAKS and NULLS, you will not be able to trace the path any further. Hook up the transmitter at the far end and trace back.

If you are marking the path as you trace it, be sure to mark the straight sections every few feet and other path variations such as curves, loops and cable bundles as accurately as possible. When you approach path variations such as slack loops, turns, butt-end splices or laterals, the PEAK and NULL indications on the receiver will behave differently than when a straight section of the path is traced. The following PATH LOCATING TRAINING EXERCISE will familiarize you with identifying these types of changes.

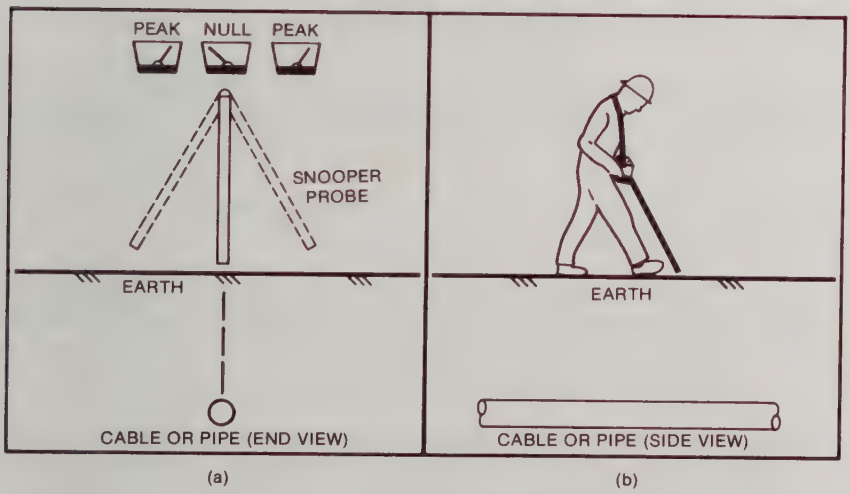

PEAK
NULL
PEAK
SNOOPER
PROBE
EARTH
CABLE OR PIPE (END VIEW)
(a)
EARTH
CABLE OR PIPE (SIDE VIEW)
(b)

**Figure 2-6.**

## PATH LOCATING TRAINING EXERCISE

PROCEDURE

1. Lay out the training exercise (see Figure 2-7).

2. Hook up the transmitter to the near end of the training exercise (see Section 2, page 22, LONG CABLE RUNS USING DIRECT CONNECTION).

3. Hook up the receiver to the snooper probe (see Section 2, page 28, HOW TO HOOK UP THE RECEIVER).

4. Move about 10 feet from the near end along the wire path. Swing the snooper probe across the path and locate the PEAK receiver meter reading. Adjust the GAIN control knob on the receiver for a PEAK meter reading of 8.

5. Trace the path and note the characteristics of the NULLS and PEAKS on the receiver meter and speaker as you swing the snooper probe across the cable path.

6. SLACK LOOP. When you reach the slack loop there will be a normal PEAK on the side of the wire opposite the loop and a much stronger PEAK above the loop.

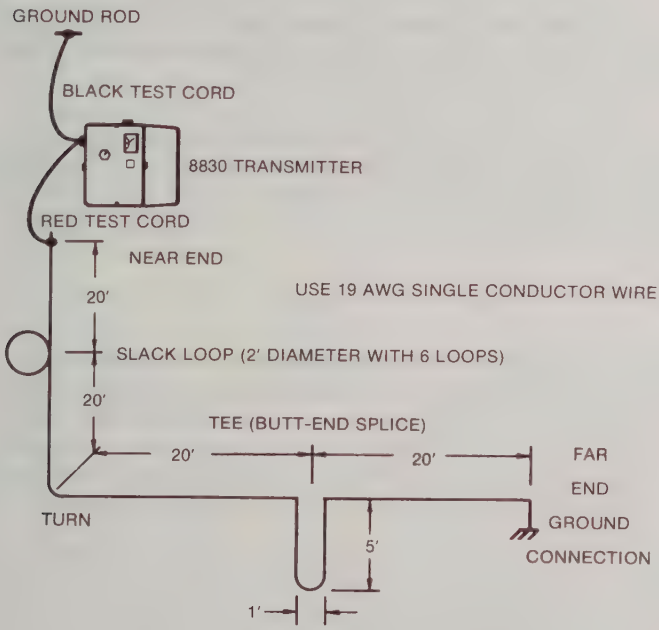

GROUND ROD
BLACK TEST CORD
8830 TRANSMITTER
RED TEST CORD
NEAR END
20'
USE 19 AWG SINGLE CONDUCTOR WIRE
SLACK LOOP (2' DIAMETER WITH 6 LOOPS)
20'
TEE (BUTT-END SPLICE)
20'
20'
FAR
END
TURN
GROUND
CONNECTION
5'
1'

**Figure 2-7.**

7. TURN. If you approach the turn at a slow pace and follow the NULL indication, you will trace a turn just slightly beyond the outside of the actual turn. If you approach the turn walking at a fast pace, you will completely miss the turn and suddenly see a drop in the PEAK.

8. TEE (Butt-end splice). If you approach the TEE at a slow pace, you will notice the PEAK on the side opposite the TEE will be normal and the PEAK over the TEE will be much weaker. If you approach the TEE at a fast pace, you probably will never notice it.

**NOTE**

After you finish tracing the path, it is a good idea to go back and find any TEES or laterals you might have missed. Simply follow along each side of the cable path, holding the snooper probe vertically and about 2 feet to one side of the cable path. When you come across a NULL, you have found the TEE or lateral.

**NOTE**

The characteristic PEAKS and NULLS experienced during the training exercise will be somewhat different than those found in underground installations. You will get more accurate results if you hold the snooper probe about 2 feet above the ground. This will simulate a buried cable or pipe 2 feet below the ground.

## HOW TO FIND THE DEPTH

PROCEDURE

1. Hook up the transmitter to the cable or pipe (see Section 2, page 17, HOW TO HOOK UP THE TRANSMITTER).

2. Hook up the receiver to the snooper probe (see Section 2, page 28, HOW TO HOOK UP THE RECEIVER).

3. Determine the spot where you want to measure the depth.

4. Swing the snooper probe across the path of the cable or pipe and locate the PEAK receiver meter reading on either side of the cable. Adjust the GAIN control knob on the receiver for a PEAK meter reading of 8.

5. Hold the snooper probe vertically (see Figure 2-8) and locate the NULL directly above the cable or pipe. Mark this spot as NULL point A.

6. Hold the snooper probe at a 45 degree angle (see Figure 2-8), using the bubble level located on the handle of the snooper probe. Move the snooper probe on a horizontal line away from NULL point A and at right angles to the path of the cable or pipe until a NULL is found. This is NULL point B.

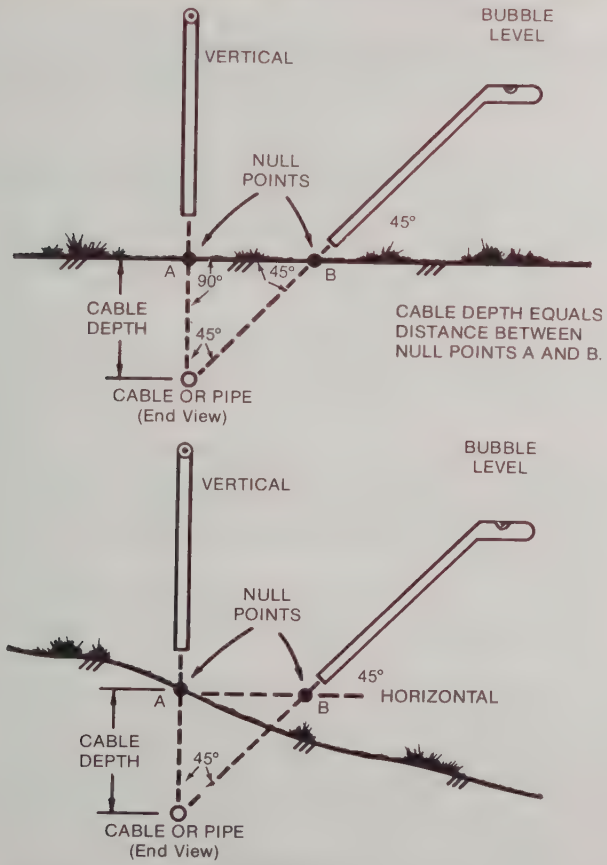

BUBBLE LEVEL
VERTICAL
NULL POINTS
45°
A
90°
45°
B
CABLE DEPTH
45°
CABLE DEPTH EQUALS DISTANCE BETWEEN NULL POINTS A AND B.
CABLE OR PIPE (End View)
BUBBLE LEVEL
VERTICAL
NULL POINTS
45°
A
B
HORIZONTAL
CABLE DEPTH
45°
CABLE OR PIPE (End View)

**Figure 2-8.**

7. The depth of the cable or pipe beneath NULL point A (see Figure 2-8) is the same as the distance between NULL points A and B.

**NOTE**

To keep your depth measurements as accurate as possible, observe the following rules:

1. Measure the depth only along a straight section of the cable or pipe.

2. Stay more than 10 feet from the transmitter hookup.

3. Stay more than 6 feet from any ground faults, areas of changing depth of the cable or pipe, and other variations such as dielectric unions (pipe), slack loops, butt-end splices or laterals.

4. Hold the snooper probe both vertically and at 45 degrees when locating NULL points A and B.

## HOW TO TRACE THE PATH OF ENERGIZED POWER CABLE

PROCEDURE

1. Hook up the receiver to the snooper probe (see Section 2, page 28, HOW TO HOOK UP THE RECEIVER).

2. Flip the TRACE TONE switch on the receiver to the 50-60 Hz position.

3. Swing the snooper probe over the energized power cable to be traced and locate the PEAK (it may be directly above or to either side of the power cable). Adjust the GAIN control knob on the receiver for a PEAK meter reading of 8.

4. Trace the path by moving along the power cable, swinging the snooper probe back and forth across its path and following the signal directly above the cable (it may be either a NULL or a PEAK).

**NOTE**

You may not always be able to trace energized power cable. Your ability to trace it depends upon your distance from the cable, the amount of current (Amps) flowing in the cable, and the orientation of the phase and neutral conductors.

**NOTE**

It is best to de-energize the power cable and refer to Section 2, page 29, HOW TO TRACE THE PATH. Never try to locate the depth of energized power cable. To get accurate depth information, de-energize the power cable and refer to Section 2, page 36, HOW TO FIND THE DEPTH, for instructions.

# SECTION 3

# LOCATING FAULTS IN TELEPHONE CABLE

## GENERAL RULES

1. DE-ENERGIZE CABLE. If the central office battery is present on the faulted circuit, the fault generally cannot be located. If possible, isolate the section of cable or pull the coils at the central office on pairs responsible for this crossed battery condition. If you hook up the transmitter while the central office battery is on line, you may blow the fuse on the transmitter which will require replacement (see Section 1, page 10, FUSE).

2. PRELIMINARY EXAMINATION. The most important step toward successful fault locating is to examine completely the trouble in the cable before you begin. Always look for possible additional faults, no matter what sort of trouble was reported. You will save time and money if you locate the easiest faults first. Often the harder-to-locate faults will be located at the same trouble spot as the easy-to-locate faults, or the easy faults will mask the hard faults and make them impossible to locate until the easy ones are repaired.

   **Use your ohmmeter** to determine which faults will be the easiest to locate. Isolate the faults to as short a section as possible. Measure the electrical resistance on both sides of the faults. Always try to locate the fault from the lowest resistance side. If you cannot locate the fault from this side, try the other.

When checking for a conductor-to-sheath fault, completely isolate the sheath from ground and examine the fault symptoms to make sure it is not a cross to a working tip or grounded pair. If the sheath shows no electrical contact to ground, test the conductor to the isolated shield. If this also shows no fault, test for a cross to a working tip or another grounded pair.

3. PATH LOCATION. Trace and mark the path of buried or underground cables before you try to locate any faults (see Section 2, page 16, LOCATING PATH AND DEPTH).

4. FAULT LOCATION. Normally, you will not be able to locate the fault unless you can hear or see the tracing tone on the receiver while you are standing at least 10 feet from the transmitter hookup and are using the equipment properly. A sudden increase or decrease in the amount of tracing tone as you move along the cable path usually indicates you have located a fault. However, changes in aerial cable size, and changes in cable depth, metallic objects near the cable, or grounded splice cases in buried or underground cable may cause changes in the amount of tracing tone and, as a result, may appear as a fault.

   Normally, a very gradual decrease in the tracing tone will occur in sheath-to-ground faults, in the no-fault sections of the cable, as you walk away from the transmitter. As necessary, adjust the receiver GAIN control to compensate for this decrease in signal level.

5. TYPES OF FAULTS. The following list shows the typical order of difficulty, from easiest to hardest, in locating various types of faults using the Model 8830 Cable Fault Locator. Note that sheath-to-ground faults do not occur in aerial cables.

   a. SHEATH-TO-GROUND, USING THE GROUND RETURN PROBE. Electrical contact between cable sheath and ground.

   b. SHEATH-TO-GROUND, USING THE SNOOPER PROBE. Electrical contact between cable sheath and ground.

   c. CONDUCTOR-TO-SHEATH. Electical contact between conductor and sheath.

   d. CROSS. Electrical contact between conductors of different pairs.

   e. SPLIT. Splicing error. One side each of 2 pairs cross-connected.

   f. CORRECTED SPLIT. Splicing error. Split is corrected at another location.

   g. SHORT. Electrical contact between conductors of same pair.

   h. OPEN. Electrical discontinuity in one or both sides of pair.

## HOW TO LOCATE FAULTS IN BURIED OR UNDERGROUND TELEPHONE CABLE

### SHEATH-TO-GROUND FAULTS (Using the ground return probe)

PROCEDURE

1. Disconnect and isolate the cable sheath at the near and far access points.

2. Connect the red test cord clip to the cable sheath at the near access point.

3. Connect the black test cord clip to the ground rod (see Figure 3-1).

4. Plug the jack end of the red/black test cord into the RED/ BLACK TEST CORD jack receptacle on the transmitter (see Figure 3-1).

5. Check the transmitter batteries by turning the control knob to the BAT. TEST position and reading the meter. Replace bad batteries.

6. Match the transmitter tracing tone power to the cable by turning the control knob until the meter reads in the GREEN. If the meter will not read in the GREEN, adjust the control knob so that both the meter and control knob read in position 1 or 5.

7. Check the receiver batteries by pressing the BAT. TEST switch and reading the meter. Replace bad batteries.

8. Open the ground return probe (see Figure 1-2, page 7).

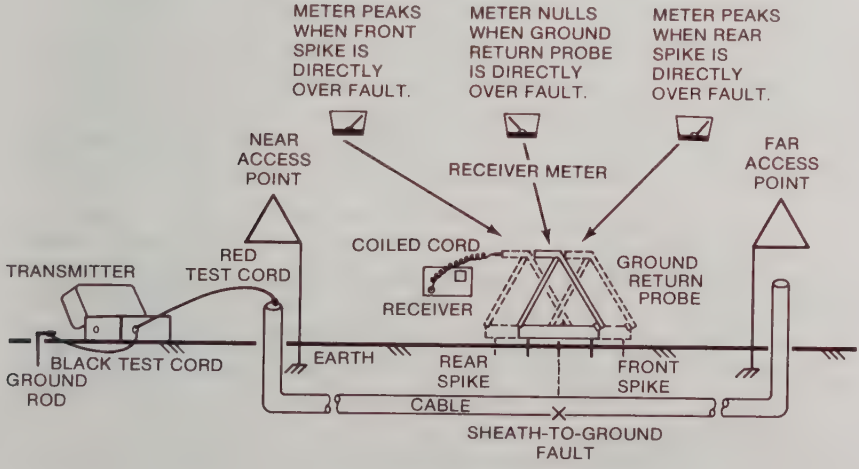



**Figure 3-1.**

9. Plug one end of the coiled cord into the jack receptacle located in the end of the ground return probe handle. Plug the other end of coiled cord into the PROBE jack receptacle on the receiver. This will turn on the receiver.

10. Flip the receiver TRACE TONE switch to the 815 Hz position.

11. Move just past the near access point along the cable path and insert the ground return probe spikes (see Figure 3-2). Rotate the GAIN control knob on the receiver until the meter reads 2.

12. Walk along the cable path toward the far access point and insert the ground return probe spikes into the ground approximately every 10 feet while checking the receiver meter level. When the meter level begins to rise sharply above previous readings, change the distance between probings from 10 feet to 6 inches.

    The meter readings will rise as you probe until a maximum (PEAK) level is reached (see Figure 3-1). Periodically adjust the GAIN control knob on the receiver to prevent meter readings greater than 10. When you reach the PEAK meter reading, change the distance between probings from 6 inches to 2 inches. While continuing to probe, the meter readings will now begin to fall until a minimum (NULL) level is reached (see Figure 3-1).

When you reach the NULL point, rotate the probe 90 degrees (right angle) about the center of the probe and check for another NULL. A NULL means you are exactly over the fault. If you don't get a NULL, move the probe forward or backward and at a right angle to the cable path until a NULL point is located. Double check the fault by rotating the probe in a circle about its center and checking for a NULL at several positions. The fault will be located directly below the arrow in the center of the probe.

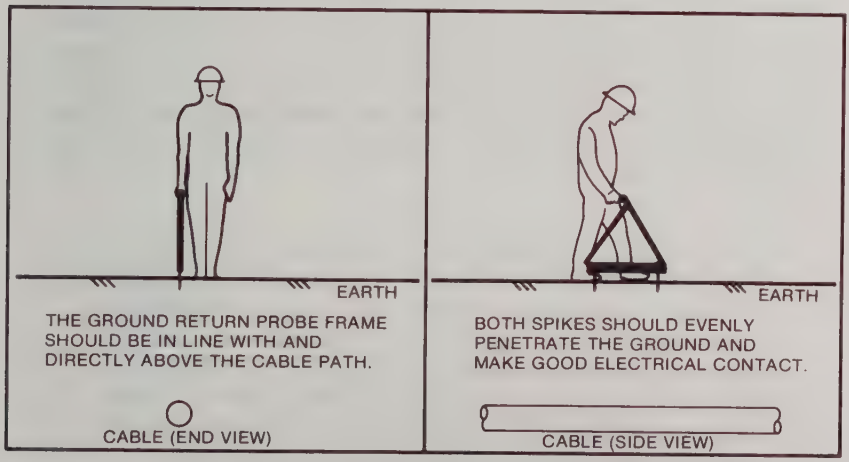

EARTH
THE GROUND RETURN PROBE FRAME SHOULD BE IN LINE WITH AND DIRECTLY ABOVE THE CABLE PATH.
CABLE (END VIEW)
(a)
EARTH
BOTH SPIKES SHOULD EVENLY PENETRATE THE GROUND AND MAKE GOOD ELECTRICAL CONTACT.
CABLE (SIDE VIEW)
(b)

**Figure 3-2.**

**NOTE**

Grounded splice cases buried along the cable path will behave like sheath-to-ground faults. If any sheath-to-ground faults are located near a grounded splice case, it may be necessary to dig up and isolate the splice case from ground before you will be able to locate the sheath-to-ground fault.

13. As a precautionary measure, move along the path and locate any other additional sheath-to-ground faults. Start with probing intervals of one foot when you leave the previous fault. Note that the meter readings will begin with a NULL, quickly increase toward the PEAK, then fade until a stable meter reading is reached. At this point, adjust the GAIN control knob on the receiver to a reference meter reading of 2. Now repeat steps 12 and 13.

**NOTE**

As you approach the far end access point it may be difficult or impossible to locate the remaining faults, depending upon the number of faults on the cable and their electrical resistance to ground. You may need to hook up the transmitter at the far access point and locate the remaining faults starting from that point or fix the faults as you locate them.

**NOTE**

After you have located and repaired those faults identified with your first pass over the cable, it is advisable to recheck the cable for additional faults that may have been masked by the more serious faults.

14. If a sheath-to-ground fault is located beneath a hard surface such as a road or driveway, it usually is possible to pinpoint the location using the triangulation method (see Figure 3-3). On one side of the hard surface, rotate the ground return probe and locate the NULL. Draw a line perpendicular (right angle) to the frame of the ground return probe starting at the arrow and toward the cable path. Repeat the process from a second point. The fault is located where the two lines intersect.

**NOTE**

To achieve the best accuracy with the triangulation method, keep the ground return probe within 20 feet of the fault.

**NOTE**

When multiple faults exist under a hard surface, it may be difficult or impossible to obtain an accurate location for each of the individual faults when using the ground return probe and the triangulation method. In some cases, you may have better luck locating the individual faults if you will use the snooper probe.

**NOTE**

The sheath-to-ground fault under a hard surface may often be located by hosing down with water the hard surface and nearby ground. Then attach cotton swabs to the ground return probe spikes and use the normal technique for locating the fault directly on the hard surface.

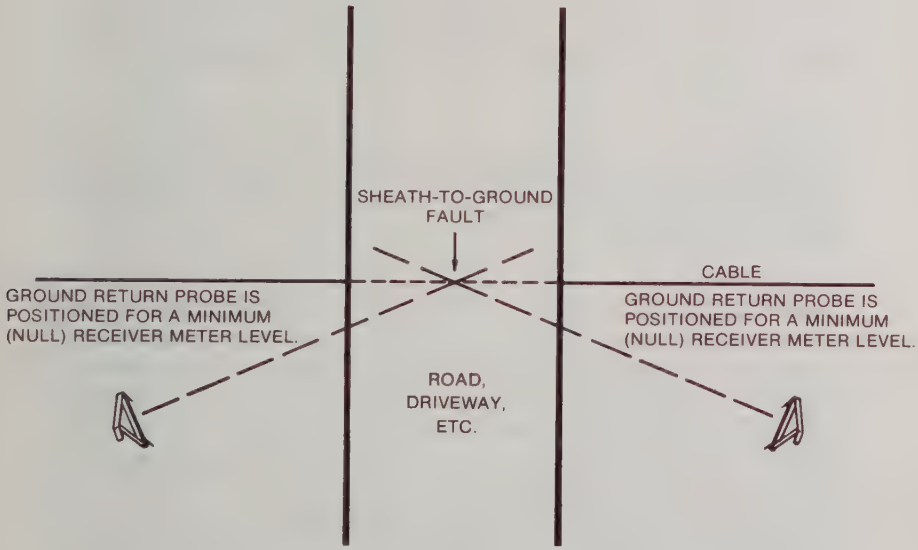

SHEATH-TO-GROUND
FAULT
CABLE
GROUND RETURN PROBE IS
POSITIONED FOR A MINIMUM
(NULL) RECEIVER METER LEVEL.
GROUND RETURN PROBE IS
POSITIONED FOR A MINIMUM
(NULL) RECEIVER METER LEVEL.
ROAD,
DRIVEWAY,
ETC.

**Figure 3-3.**

## GENERAL INSTRUCTIONS (Using the snooper probe)

The following set of instructions explain how to locate the remaining types of faults in buried and underground cable once you have hooked up the transmitter. The transmitter hookup diagrams and procedures follow this set of instructions.

PROCEDURE

1. Check the transmitter batteries by turning the TRANSMITTER POWER control knob to the BAT. TEST position and reading the meter. Replace bad batteries.

2. Match the transmitter tracing tone power to the cable by turning the TRANSMITTER POWER control knob until the meter reads in the GREEN. If the meter will not read in the GREEN, adjust the control knob so that both the meter and control knob read in position 1 or 5. Position 1 represents a low resistance fault. Position 5 represents a high resistance fault.

3. Check the receiver batteries by pressing the BAT. TEST switch and reading the meter. Replace bad batteries.

4. Plug one end of the coiled cord into the jack receptacle located in the end of the snooper probe handle. Plug the other end of the coiled cord into the PROBE jack receptacle on the receiver. This will turn on the receiver.

5. Flip the TRACE TONE switch on the receiver to the 815 Hz position.

6. Move 10 feet from the near access point toward the far access point. Swing the snooper probe across the cable path and find the PEAK meter reading on the receiver. The PEAK will be located either directly above the cable or on both sides (NULL located directly above the cable).

   Adjust the GAIN control knob on the receiver for a PEAK meter reading of 8. If you cannot adjust the GAIN control knob for a PEAK meter reading as high as 8, then rotate the GAIN control knob to position 10 (maximum gain). As long as you can detect the PEAKS and NULLS on the receiver meter or audio output tone when you use the snooper probe, you may be able to locate the fault.

   If the PEAK is located directly over the cable, continue with paragraph 7. If the peak is located on both sides of the cable, continue with paragraph 8.

7. Hold the snooper probe directly over the cable as you walk toward the fault. Every 2 to 6 feet, you can expect that the audio output and meter reading will fluctuate up and down; this results from the twist and lay of the conductors and is frequently referred to as "picket fencing".

   Readjust the GAIN control knob as necessary to keep the PEAK meter reading at a level of 8. The last PEAK you pass will be the location of the fault. When you pass the fault, any remaining signals you see on the meter will be at much lower levels. Continue with paragraph 9.

8. Swing the snooper probe back and forth across the cable path as you walk toward the fault. Watch and listen for the PEAKS on both sides of the cable path. As you approach the fault the PEAK meter readings will fade until they level off to a lower meter reading past the fault. The fault is located halfway between where the PEAK meter reading started to fade and where it leveled off at the lower PEAK meter reading.

9. Dig up and expose the cable. Turn on the transmitter and receiver as before and move the snooper probe along the side of the exposed cable. The point at which a sudden drop in the PEAK meter reading occurs, pinpoints the exact location of the fault.

**NOTE**

If you cannot find the fault by the previous methods, it may be necessary to use a technique called "potholing". Dig a pothole 10 feet from the near access point along the cable path. Use the snooper probe to locate a PEAK receiver meter reading along the sides of the exposed cable. Adjust the PEAK receiver meter reading to 8.

Dig a pothole halfway along the path toward the far access point. Find the PEAK meter reading using the snooper probe. If there still is a strong PEAK signal, then the fault is toward the far access point. If the PEAK signal is weak, then the fault has been passed. After determining which direction the fault lies from the last pothole, proceed to halve this section and continue repeating this process until you have located the fault.

## SHEATH-TO-GROUND FAULTS (Using the snooper probe)

PROCEDURE

1. Disconnect and isolate the cable sheath at the near and far access points.

2. Connect the red test cord clip to the cable sheath at the near access point.

3. Connect the black test cord clip to the ground rod (see Figure 3-4).

4. Plug the jack end of the red/black test cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 3-4).

5. Match the transmitter to the fault, hook up the snooper probe to the receiver and locate the fault. Refer to Section 3, page 52, GENERAL INSTRUCTIONS, for a more detailed procedure.

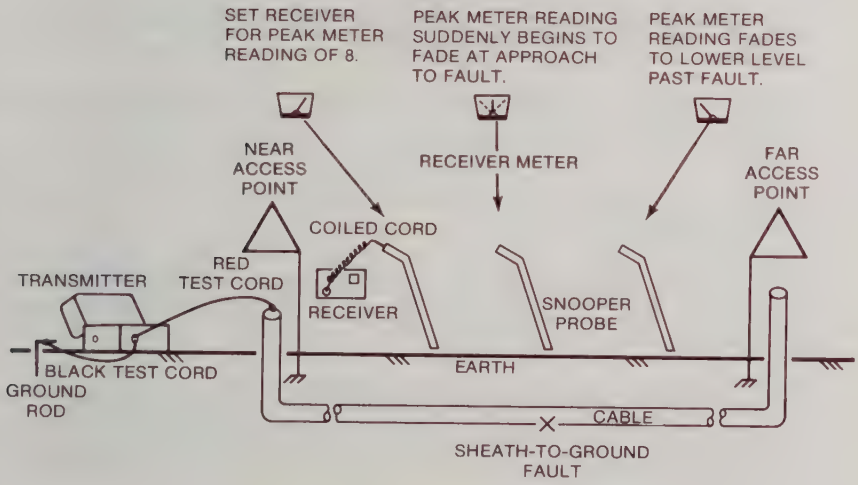

SET RECEIVER FOR PEAK METER READING OF 8.
PEAK METER READING SUDDENLY BEGINS TO FADE AT APPROACH TO FAULT.
PEAK METER READING FADES TO LOWER LEVEL PAST FAULT.
NEAR ACCESS POINT
RECEIVER METER
FAR ACCESS POINT
COILED CORD
RED TEST CORD
TRANSMITTER
RECEIVER
SNOOPER PROBE
BLACK TEST CORD
GROUND ROD
EARTH
CABLE
SHEATH-TO-GROUND FAULT

**Figure 3-4.**

## CONDUCTOR-TO-SHEATH FAULTS

PROCEDURE

1. Disconnect and isolate the cable sheath and faulted conductor at the near and far access points.

2. Connect the red test cord clip to the faulted conductor at the near access point.

3. Connect the black test cord clip to the cable sheath at the near access point.

4. Plug the jack end of the red/black test cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 3-5).

5. Match the transmitter to the fault, hook up the snooper probe to the receiver and locate the fault. Refer to Section 3, page 52, GENERAL INSTRUCTIONS, for a more detailed procedure.

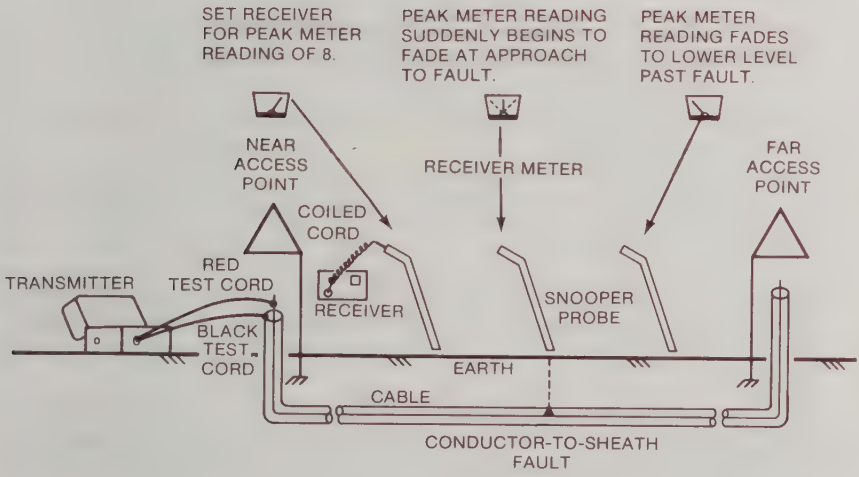

SET RECEIVER FOR PEAK METER READING OF 8.
PEAK METER READING SUDDENLY BEGINS TO FADE AT APPROACH TO FAULT.
PEAK METER READING FADES TO LOWER LEVEL PAST FAULT.
NEAR ACCESS POINT
RECEIVER METER
FAR ACCESS POINT
COILED CORD
RED TEST CORD
TRANSMITTER
RECEIVER
SNOOPER PROBE
BLACK TEST CORD
EARTH
CABLE
CONDUCTOR-TO-SHEATH FAULT

**Figure 3-5.**

## CROSS FAULTS

PROCEDURE

1. Disconnect and isolate the cable sheath and crossed conductors at the near and far access points.

2. Connect the red test cord clip to one of the crossed conductors at the near access point.

3. Connect the black test cord clip to the other crossed conductor at the near access point.

4. Plug the jack end of the red/black test cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 3-6).

5. Match the transmitter to the fault, hook up the snooper probe to the receiver and locate the fault. Refer to Section 3, page 52, GENERAL INSTRUCTIONS, for a more detailed procedure.

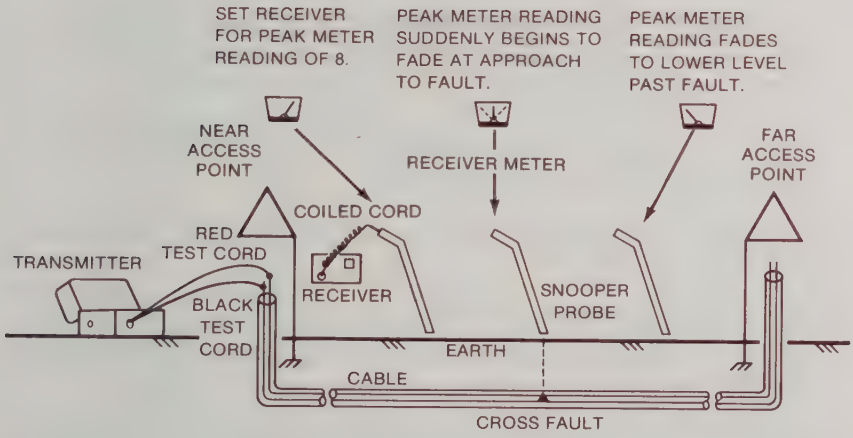

SET RECEIVER FOR PEAK METER READING OF 8.
PEAK METER READING SUDDENLY BEGINS TO FADE AT APPROACH TO FAULT.
PEAK METER READING FADES TO LOWER LEVEL PAST FAULT.
NEAR ACCESS POINT
RECEIVER METER
FAR ACCESS POINT
COILED CORD
RED TEST CORD
TRANSMITTER
RECEIVER
SNOOPER PROBE
BLACK TEST CORD
EARTH
CABLE
CROSS FAULT

**Figure 3-6.**

## SPLIT FAULTS

PROCEDURE

1. Disconnect and isolate the cable sheath and one of the two wire pairs (associated with the split fault) at the far access point. Short together the isolated wire pair (see Figure 3-7).

2. Disconnect and isolate the cable sheath and necessary wires at the near access point (see Figure 3-7).

3. Hook up the red and black test cord clips at the near access point (see Figure 3-7).

4. Plug the jack end of the red/black test cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 3-7).

5. Match the transmitter to the fault, hook up the snooper probe to the receiver and locate the fault. The fault is a man-made splicing error and will be located in a closure. Refer to Section 3, page 52, GENERAL INSTRUCTIONS, for a more detailed procedure.

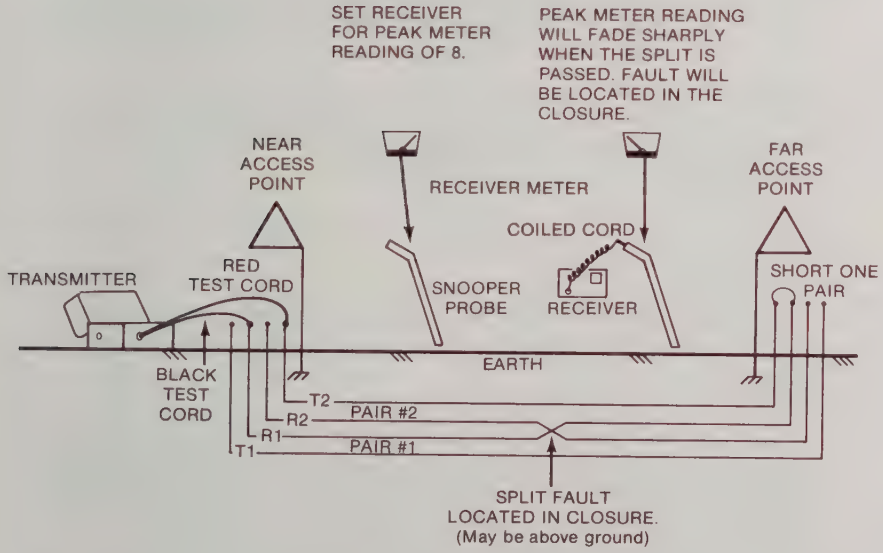

SET RECEIVER FOR PEAK METER READING OF 8.
PEAK METER READING WILL FADE SHARPLY WHEN THE SPLIT IS PASSED. FAULT WILL BE LOCATED IN THE CLOSURE.
NEAR ACCESS POINT
RECEIVER METER
FAR ACCESS POINT
COILED CORD
TRANSMITTER
RED TEST CORD
SNOOPER PROBE
RECEIVER
SHORT ONE PAIR
EARTH
BLACK TEST CORD
T2
R2
PAIR #2
R1
T1
PAIR #1
SPLIT FAULT LOCATED IN CLOSURE.
(May be above ground)

**Figure 3-7.**

## CORRECTED SPLIT FAULTS

PROCEDURE

1. Disconnect and isolate the cable sheath and one of the two wire pairs (associated with the split and corrected split faults) at the far access point. Short together the isolated wire pair (see Figure 3-8).

2. Disconnect and isolate the cable sheath and necessary wires at the near access point (see Figure 3-8).

3. Hook up the red and black test cord clips at the near access point (see Figure 3-8).

4. Plug the jack end of the red/black test cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 3-8).

5. Match the transmitter to the fault and hook up the snooper probe to the receiver. Locate the split and corrected split faults in a manner similar to the detailed procedure shown in Section 3, page 52, GENERAL INSTRUCTIONS. However, note that when you begin to locate the split, you will set up the receiver PEAK meter reading initially to a value of 2 instead of 8. Then you will be looking for a rising PEAK reading as you come

across the split fault. To locate the corrected split, set up a reference PEAK meter reading of 8 when you are 10 feet past the split fault. Then locate the corrected split by looking for a fading PEAK reading as you pass the fault. Both the split and corrected split faults are man-made splicing errors and will be located in closures.

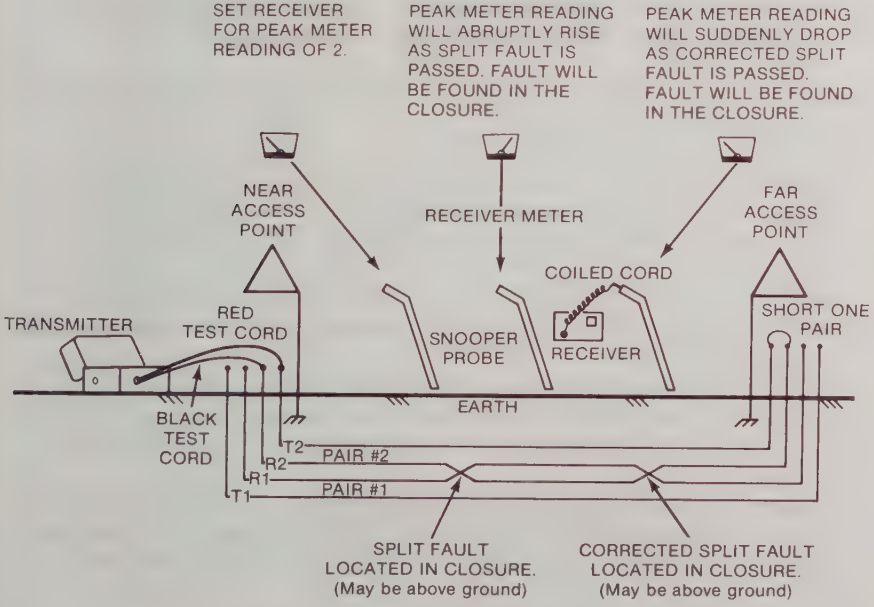

SET RECEIVER FOR PEAK METER READING OF 2.
PEAK METER READING WILL ABRUPTLY RISE AS SPLIT FAULT IS PASSED. FAULT WILL BE FOUND IN THE CLOSURE.
PEAK METER READING WILL SUDDENLY DROP AS CORRECTED SPLIT FAULT IS PASSED. FAULT WILL BE FOUND IN THE CLOSURE.
NEAR ACCESS POINT
RECEIVER METER
FAR ACCESS POINT
COILED CORD
TRANSMITTER
RED TEST CORD
SNOOPER PROBE
RECEIVER
SHORT ONE PAIR
EARTH
BLACK TEST CORD
T2
R2
PAIR #2
R1
T1
PAIR #1
SPLIT FAULT LOCATED IN CLOSURE. (May be above ground)
CORRECTED SPLIT FAULT LOCATED IN CLOSURE. (May be above ground)

**Figure 3-8.**

## SHORT FAULTS

PROCEDURE

1. Disconnect and isolate the cable sheath and shorted conductors at the near and far access points.

2. Connect the red test cord clip to one of the shorted conductors at the near access point.

3. Connect the black test cord clip to the other shorted conductor at the near access point.

4. Connect the yellow test cord clip to the cable sheath at the near access point. If you cannot locate the fault with this hookup, try connecting the yellow test cord clip to a ground rod.

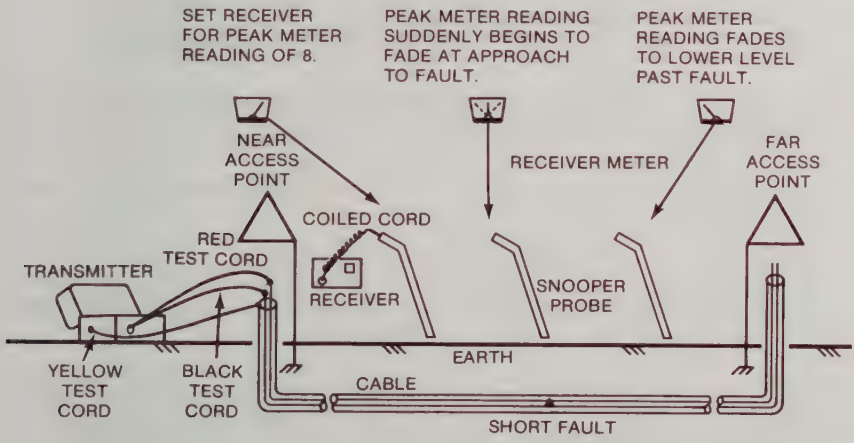
5. Plug the jack end of the red/black test cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 3-9).

6. Plug the jack end of the yellow test cord into the YELLOW TEST CORD jack receptacle on the transmitter (see Figure 3-9).

7. Match the transmitter to the fault, hook up the snooper probe to the receiver and locate the fault. Refer to Section 3, page 52, GENERAL INSTRUCTIONS, for a more detailed procedure.

**NOTE**

The yellow test cord connects the transmitter capacitor loading output to the cable being tested. It is used to unbalance the tracing tone signal in the cable. This allows the snooper probe to pick up the tracing tone and assist you in locating the fault.




**NOTE**

IF YOU CANNOT LOCATE THE FAULT, TRY CONNECTING THE YELLOW TEST CORD TO A GROUND ROD.

**Figure 3-9.**

## OPEN FAULTS

PROCEDURE

1. Disconnect and isolate the cable sheath at the near and far access points.

2. Disconnect the open conductor at the near access point.

3. Connect the red test cord clip to the open conductor at the near access point.

4. Connect the black test cord clip to the cable sheath at the near access point.

5. Plug the jack end of the red/black test cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 3-10).

6. Match the transmitter to the fault, hook up the snooper probe to the receiver and locate the fault. Refer to Section 3, page 52, GENERAL INSTRUCTIONS, for a more detailed procedure.

**NOTE**

True opens normally cannot be located with this type of equipment. However, occasionally you will be able to locate an open due to its effect upon other conductors in the cable. Your success will depend upon the cable depth, the type of cable and most of all, your ability to detect very small PEAK meter changes.

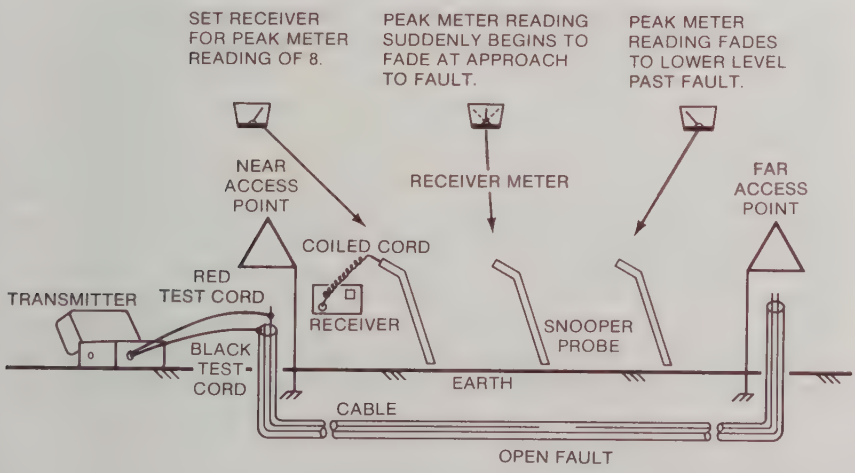



**Figure 3-10.**

## HOW TO LOCATE FAULTS IN AERIAL TELEPHONE CABLE

Aerial faults are similar to buried or underground cable faults except that sheath-to-ground faults cannot occur in aerial cable. You will use the same transmitter hookups for aerial cable as you did for buried or underground cable. Refer to Section 3, page 44, HOW TO LOCATE FAULTS IN BURIED OR UNDERGROUND TELEPHONE CABLE, for the proper transmitter hookup for each type of fault.

The technique for locating aerial cable faults differs from that used for buried cable. An exploring coil is attached to a layup stick (a telescoping pole that changes length from approximately 6 feet to 27 feet) and is used to pinpoint the faults. The exploring coil is held in direct contact with the aerial telephone cable and picks up the tracing tone signal. A change in tracing tone levels normally indicates the location of a fault. If the exploring coil is held away from the cable, very little tracing tone signal will be picked up and false trouble indications may result.

Occasionally the snooper probe can be used to find the general location of a fault. The snooper probe is waved back and forth underneath the aerial cable. The PEAK tracing tone signal is located either directly beneath or on both sides of the cable path.

The fault is located by following the PEAK signals and locating the cable section where the PEAK signal fades. Another method is to stick the snooper probe out the window of a car or truck and drive toward the fault. When the fault is passed, the PEAK signal will drop off. Most of the time there is not a strong enough tracing tone signal for the snooper probe to be used. When the signal is strong enough for the use of the snooper probe in finding the general location of the fault, the exact fault location is then pinpointed using the exploring coil and layup stick.

The following procedure and diagram (Figure 3-11) illustrate how to use the exploring coil and layup stick to locate aerial telephone cable faults.

PROCEDURE

1. Hook up the transmitter to the aerial cable. Refer to Section 3, page 44, HOW TO LOCATE FAULTS IN BURIED OR UNDERGROUND TELEPHONE CABLE.

2. Check the transmitter batteries by turning the TRANSMITTER POWER control knob to the BAT. TEST position and reading the meter. Replace bad batteries.

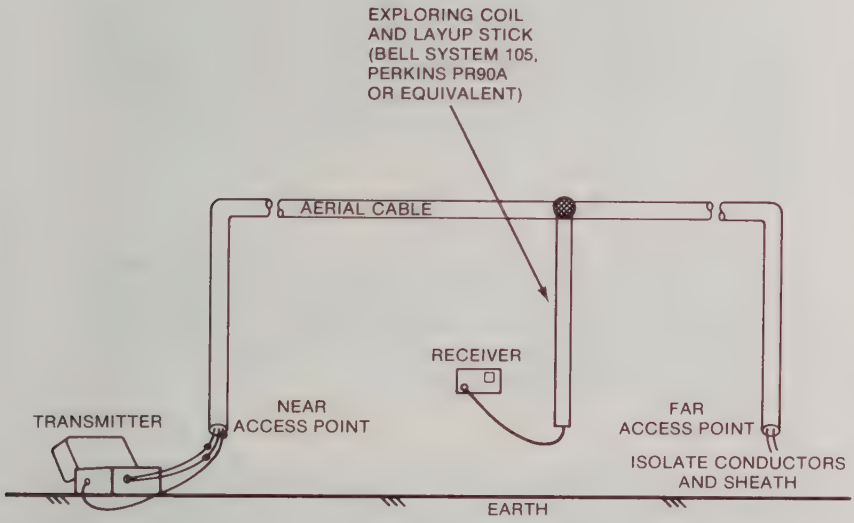
3. Match the transmitter tracing tone power to the cable by turning the TRANSMITTER POWER control knob until the meter reads in the GREEN. If the meter will not read in the GREEN, adjust the control knob so that both the meter and control knob read in position 1 or 5. Position 1 represents a low resistance fault. Position 5 represents a high resistance fault.

4. Check the receiver batteries by pressing the BAT. TEST switch and reading the meter. Replace bad batteries.

5. Plug the exploring coil cord into the PROBE jack receptacle on the receiver. This will turn the receiver on. Use an exploring coil and layup stick similar to Bell System 105 or Perkins PR90A.

6. Flip the TRACE TONE switch on the receiver to the 815 Hz position.

7. Move 10 feet from the near access point. Hold the exploring coil against the cable. Notice that the receiver meter reading fluctuates as the exploring coil is moved along the cable. Carefully locate the largest peak receiver meter reading and adjust the GAIN control knob on the receiver for a PEAK meter reading of 8.




**NOTE**
REFER TO SECTION 3, PAGE 44, HOW TO LOCATE FAULTS IN BURIED OR UNDERGROUND TELEPHONE CABLE, FOR PROPER TRANSMITTER HOOKUP INFORMATION.

**Figure 3-11.**

8. To avoid the time-consuming job of walking an entire aerial cable section, move the exploring coil to the midpoint of the cable section being tested and check for the PEAK receiver meter reading. If the PEAK meter reading has fallen off, you have already passed the fault. If the PEAK meter reading is still 8, you know the fault is further down the cable. Continue to halve the remaining cable until the fault is isolated to a short section of the cable.

**NOTE**

The peak tracing tone signal will fluctuate every 2 to 6 feet, depending upon the twist and lay of the conductors within the cable. Be sure to explore several feet of the cable to locate the highest peak receiver meter reading.

9. When you have the fault isolated to a short section of the cable, pinpoint its exact location by moving toward the fault from the near access point. Hold the exploring coil against the cable. When the fault is passed, the PEAK meter reading will drop abruptly. This drop may be small or large, depending upon the severity of the fault.

**NOTE**

When locating split or corrected split faults in aerial cable, note that the fault will be located in a closure. You only need to check the peak receiver meter reading on both sides of each closure to tell which closures contain a fault.

# SECTION 4

# LOCATING FAULTS IN POWER CABLE

## GENERAL RULES

1. DE-ENERGIZE CABLE. Always de-energize the circuit before you use the ohmmeter or hook up the fault locating equipment.

2. PRELIMINARY EXAMINATION. The most important step toward successful fault locating is to examine the trouble in the cable before you begin. Always look for possible additional faults, no matter what sort of trouble was reported. You will save time and money if you locate the easiest faults first. Often the harder-to-locate faults will be at the same spot as the easy-to-locate faults, or the easy ones will mask the hard ones and make them impossible to locate until the easy faults are repaired.

   **Use your ohmmeter** to determine which faults will be the easiest to locate. Isolate the faults to a short cable section. Measure the electrical resistance on both sides of the fault. Always try to locate the fault from the lowest resistance side. If you cannot locate the fault from this side, try the other side.

3. PATH LOCATION. Trace and mark the path of the cable before you try to locate any faults (see Section 2, page 16, LOCATING PATH AND DEPTH).

4. FAULT LOCATION. Normally, you will not be able to locate the fault unless you can hear or see the tracing tone on the receiver while you are standing at least 10 feet from the transmitter hookup and are using the equipment properly. A sudden increase or decrease in the amount of tracing tone as you move along the cable path usually indicates a fault. However, similar changes in tracing tone may be caused by nearby metallic objects or by changes in the cable depth.

   A very gradual decrease in the amount of tracing tone normally occurs in sheath-to-ground faults, in the no-fault sections of the cable, as you walk away from the transmitter. Adjust the receiver GAIN control knob to compensate for this decrease in signal level.

## HOW TO LOCATE FAULTS IN BURIED OR UNDERGROUND POWER CABLE

### PHASE-TO-GROUND FAULTS (Using the ground return probe)

PROCEDURE

1. Disconnect and isolate the conductor at the near and far access points.

2. Connect the red test cord clip to the conductor at the near access point.

3. Connect the black test cord clip to the ground rod (see Figure 4-1).

4. Plug the jack end of the red/black test cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 4-1).

5. Match the transmitter to the fault, hook up the ground return probe to the receiver and locate the fault. Refer to Section 3, page 44, SHEATH-TO-GROUND FAULTS (Using the ground return probe), steps 5-14, for a more detailed procedure.

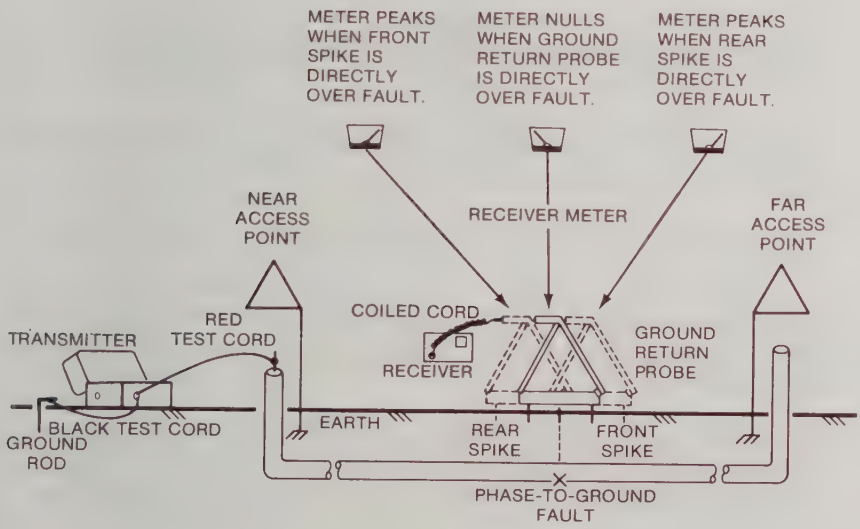

METER PEAKS WHEN FRONT SPIKE IS DIRECTLY OVER FAULT.
METER NULLS WHEN GROUND RETURN PROBE IS DIRECTLY OVER FAULT.
METER PEAKS WHEN REAR SPIKE IS DIRECTLY OVER FAULT.
NEAR ACCESS POINT
RECEIVER METER
FAR ACCESS POINT
COILED CORD
RED TEST CORD
TRANSMITTER
RECEIVER
GROUND RETURN PROBE
BLACK TEST CORD
GROUND ROD
EARTH
REAR SPIKE
FRONT SPIKE
PHASE-TO-GROUND FAULT

**Figure 4-1.**

## PHASE-TO-GROUND FAULTS (Using the snooper probe)

PROCEDURE

1. Disconnect and isolate the conductor at the near and far access points.

2. Connect the red test cord clip to the conductor at the near access point.

3. Connect the black test cord clip to the ground rod (see Figure 4-2).

4. Plug the jack end of the red/black test cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 4-2).

5. Match the transmitter to the fault, hook up the snooper probe to the receiver and locate the fault. Refer to Section 3, page 52, GENERAL INSTRUCTIONS, for a more detailed procedure.

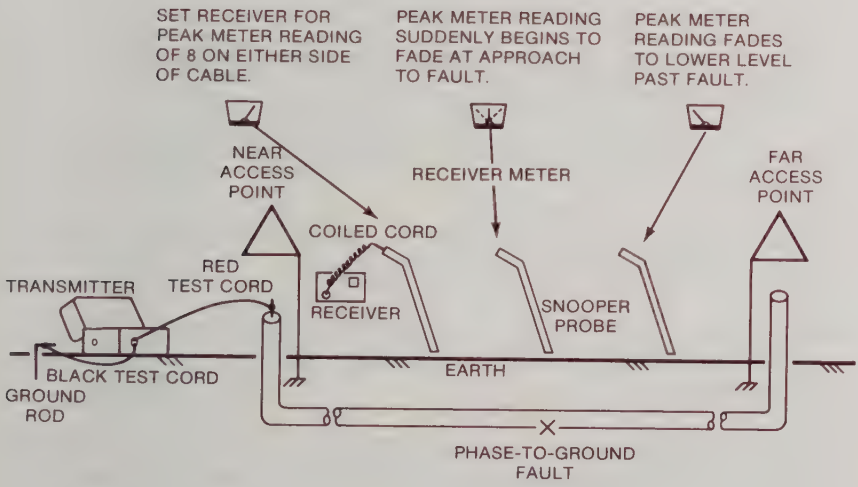

SET RECEIVER FOR PEAK METER READING OF 8 ON EITHER SIDE OF CABLE.
PEAK METER READING SUDDENLY BEGINS TO FADE AT APPROACH TO FAULT.
PEAK METER READING FADES TO LOWER LEVEL PAST FAULT.
NEAR ACCESS POINT
RECEIVER METER
FAR ACCESS POINT
COILED CORD
RED TEST CORD
TRANSMITTER
RECEIVER
SNOOPER PROBE
BLACK TEST CORD
GROUND ROD
EARTH
PHASE-TO-GROUND FAULT

**Figure 4-2.**

## PHASE-TO-NEUTRAL OR PHASE-TO-PHASE FAULTS

PROCEDURE

1. Disconnect and isolate the two shorted conductors at the near and far access points.

2. Connect the red test cord clip to a shorted phase conductor at the near access point.

3. Connect the black test cord clip to the shorted neutral or other phase conductor at the near access point.

4. Plug the jack end of the red/black test cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 4-3).

5. Match the transmitter to the fault, hook up the snooper probe to the receiver and locate the fault. Refer to Section 3, page 52, GENERAL INSTRUCTIONS, for a more detailed procedure.

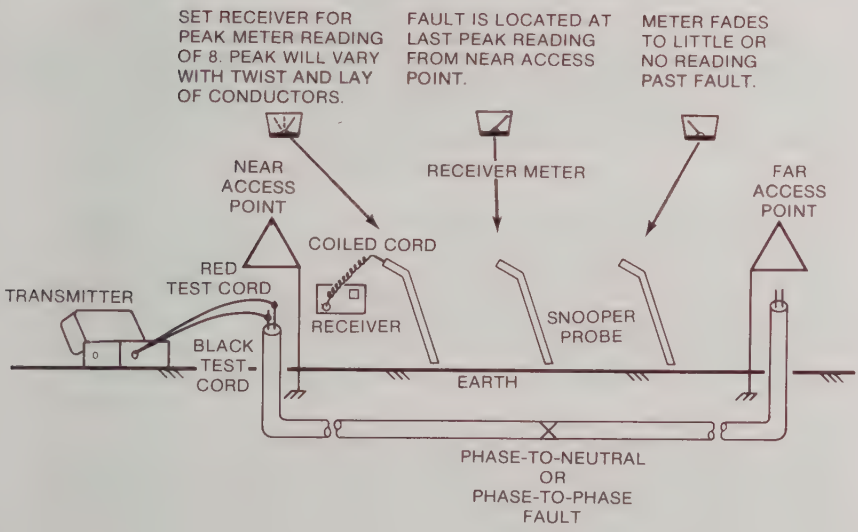

SET RECEIVER FOR PEAK METER READING OF 8. PEAK WILL VARY WITH TWIST AND LAY OF CONDUCTORS.
FAULT IS LOCATED AT LAST PEAK READING FROM NEAR ACCESS POINT.
METER FADES TO LITTLE OR NO READING PAST FAULT.
NEAR ACCESS POINT
RECEIVER METER
FAR ACCESS POINT
COILED CORD
RED TEST CORD
TRANSMITTER
RECEIVER
SNOOPER PROBE
BLACK TEST-CORD
EARTH
PHASE-TO-NEUTRAL OR PHASE-TO-PHASE FAULT

**Figure 4-3.**

## HOW TO LOCATE FAULTS IN AERIAL POWER CABLE

Aerial power cable faults normally are easy to locate. Either the aerial fault will burn itself due to the high voltages and power, making it easily visible, or there will be downed lines.

If you encounter a situation where you need to use the Model 8830 Cable Fault Locator to locate aerial cable, refer to Section 3, page 70, HOW TO LOCATE FAULTS IN AERIAL TELEPHONE CABLE.

# SECTION 5

# LOCATING FAULTS AND PATH IN CATV COAXIAL CABLE

## GENERAL RULES

1. DE-ENERGIZE CABLE. Always de-energize the center conductor before you hook it up to the ohmmeter or fault locating equipment. It may be necessary to isolate the sheath when you hook it up to the ohmmeter.

2. PRELIMINARY EXAMINATION. The most important step toward successful fault locating is to examine the trouble in the cable before you begin. Faults in CATV coaxial cable generally are caused by unknowing workmen damaging the cable or by water getting through a break in the polyethylene jacket and corroding the outer, and possibly the inner, conductor.

   The types of faults in coaxial cable are sheath-to-ground and conductor-to-sheath. Use the ohmmeter to determine the type of faults on the cable. Be sure to isolate the cable sheath from ground before you check for a sheath-to-ground fault. If both types of faults exist on the same cable, attempt to locate the sheath-to-ground fault first because it is easier to find and may be located at the same trouble spot as the conductor-to-sheath fault.

3. PATH LOCATION. Trace and mark the path of the cable before you try to locate any faults. See Section 2, page 16, LOCATING PATH AND DEPTH and Section 5, page 87, SPECIAL NOTES ON LOCATING PATH, for details on locating path and depth.

4. FAULT LOCATION. Normally, you will not be able to locate the fault unless you can hear or see the tracing tone on the receiver while you are standing at least 10 feet from the transmitter hookup and are using the equipment properly. A sudden increase or decrease in the amount of tracing tone when you move along the cable path usually indicates a fault. However, similar changes in tracing tone may be caused by nearby metallic objects or by changes in the cable depth.

   A very gradual decrease in the amount of tracing tone normally occurs in sheath-to-ground faults, in the no-fault sections of the cable, while you walk away from the transmitter. Adjust the GAIN control knob to compensate for this decrease in signal level.

**SPECIAL NOTES ON LOCATING PATH (In buried and underground CATV coaxial cable)**

1. By always using the sheath to locate path and depth, you will not have to disrupt any customer service drops. The only disconnect you might have to make is the connection to the ground rod at the connector where the service enters the customer's house.

2. To trace several drops from one distribution splitter, hook up the red test cord clip to the ground on the splitter and the black test cord clip to a ground rod. Occasionally you will not be able to trace a particular drop due to unbalance in the distributed grounding network. In this case refer to note 3 below.

3. You can always trace a drop by hooking up the transmitter at the home's entrance point. Simply unhook the wire to the grounding rod, hook up the red test cord clip to the connector at the entrance point where the wire to the ground rod was attached and hook up the black test cord clip to the ground rod.

4. Refer to Section 2, page 16, LOCATING PATH AND DEPTH, for additional information on how to locate cable path and depth.

## HOW TO LOCATE FAULTS IN BURIED OR UNDERGROUND CATV COAXIAL CABLE

### SHEATH-TO-GROUND FAULTS (Using the ground return probe)

PROCEDURE

1. Disconnect and isolate the cable sheath at the near and far access points.

2. Connect the red test cord clip to the cable sheath at the near access points.

3. Connect the black test cord clip to the ground rod (see Figure 5-1).

4. Plug the jack end of the red/black test cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 5-1).

5. Match the transmitter to the fault, hook up the ground return probe to the receiver and locate the fault. Refer to Section 3, page 44, SHEATH-TO-GROUND FAULTS (Using the ground return probe), steps 5-14, for a more detailed procedure.

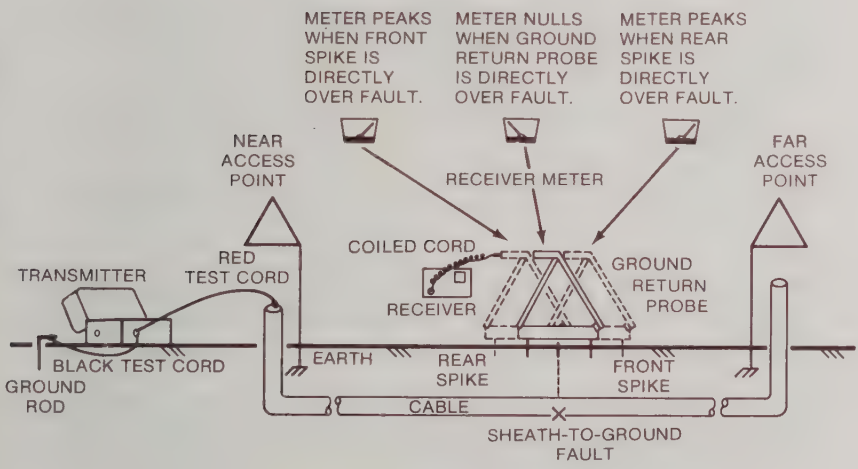

METER PEAKS WHEN FRONT SPIKE IS DIRECTLY OVER FAULT.
METER NULLS WHEN GROUND RETURN PROBE IS DIRECTLY OVER FAULT.
METER PEAKS WHEN REAR SPIKE IS DIRECTLY OVER FAULT.
NEAR ACCESS POINT
RECEIVER METER
FAR ACCESS POINT
COILED CORD
RED TEST CORD
TRANSMITTER
RECEIVER
GROUND RETURN PROBE
BLACK TEST CORD
GROUND ROD
EARTH
REAR SPIKE
FRONT SPIKE
CABLE
SHEATH-TO-GROUND FAULT

**Figure 5-1.**

## SHEATH-TO-GROUND FAULTS (Using the snooper probe)

PROCEDURE

1. Disconnect and isolate the cable sheath at the near and far access points.

2. Connect the red test cord clip to the cable sheath at the near access point.

3. Connect the black test cord clip to the ground rod (see Figure 5-2).

4. Plug the jack end of the red/black test cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 5-2).

5. Match the transmitter to the fault, hook up the snooper probe to the receiver and locate the fault. Refer to Section 3, page 52, GENERAL INSTRUCTIONS, for a more detailed procedure.

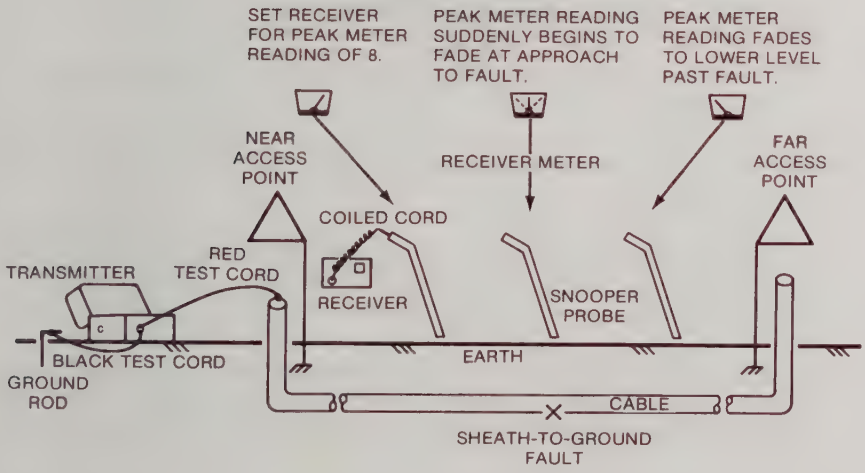

SET RECEIVER FOR PEAK METER READING OF 8.
PEAK METER READING SUDDENLY BEGINS TO FADE AT APPROACH TO FAULT.
PEAK METER READING FADES TO LOWER LEVEL PAST FAULT.
NEAR ACCESS POINT
RECEIVER METER
FAR ACCESS POINT
COILED CORD
RED TEST CORD
TRANSMITTER
RECEIVER
SNOOPER PROBE
BLACK TEST CORD
EARTH
GROUND ROD
CABLE
SHEATH-TO-GROUND FAULT

**Figure 5-2.**

## CONDUCTOR-TO-SHEATH FAULTS

PROCEDURE

1. Disconnect and isolate the cable sheath and faulted conductor at the near and far access points.

2. Connect the red test cord clip to the faulted conductor at the near access point.

3. Connect the black test cord clip to the cable sheath at the near access point.

4. Plug the jack end of the red/black test cord into the RED/BLACK TEST CORD jack receptacle on the transmitter (see Figure 5-3).

5. Match the transmitter to the fault, hook up the snooper probe to the receiver and locate the fault. Refer to Section 3, page 52, GENERAL INSTRUCTIONS, for a more detailed procedure.

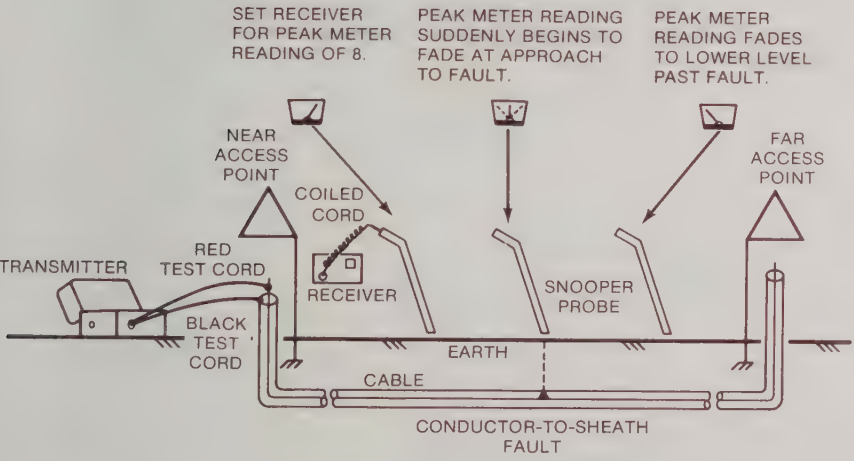

SET RECEIVER FOR PEAK METER READING OF 8.
PEAK METER READING SUDDENLY BEGINS TO FADE AT APPROACH TO FAULT.
PEAK METER READING FADES TO LOWER LEVEL PAST FAULT.
NEAR ACCESS POINT
COILED CORD
FAR ACCESS POINT
TRANSMITTER
RED TEST CORD
RECEIVER
SNOOPER PROBE
BLACK TEST CORD
EARTH
CABLE
CONDUCTOR-TO-SHEATH FAULT

**Figure 5-3.**

## HOW TO LOCATE FAULTS IN AERIAL CATV COAXIAL CABLE

The type of fault found in aerial coaxial cable is the conductor-to-sheath fault. You will use the transmitter hookup shown in Figure 5-3. For detailed instructions on how to locate aerial cable faults, refer to Section 3, page 70, HOW TO LOCATE FAULTS IN AERIAL TELEPHONE CABLE.

## MODEL 8830 SPECIFICATIONS

### TRANSMITTER

| | |
|---|---|
| Tone Frequency: | 815 ± 3 Hz |
| Tone Identifier (Modulation Rate): | 3.2 Ticks/sec. |
| Output Power: | 3 watts nominal |
| Max. Open Circuit Output Voltage: | 200 V peak AC |
| Power Source: | Two 6 volt NEDA #908 lantern batteries (Eveready 509 or equivalent) |
| Operating Temp. Range: | -10 to +55°C (14 to 131°F) |
| Size: | 11.0 x 8.0 x 7.2 inches (27.9 x 20.3 x 18.3 cm) |
| Weight: | 9.3 lbs. (4.22 kg) |

Miscellaneous:

Transmitter Power control knob for accurate load matching.
Foreign voltage fuse protection.
Storage compartment for receiver and accessories.

**RECEIVER**

| | |
|---|---|
| Input Frequency: | 815 ± 5 Hz |
| Speaker (FM Output Frequency Range): | 1,000 to 5,000 Hz typical |
| Filter Skirt Selectivity (815 Hz Trace Tone Mode): | Greater than 95 dB at 540 Hz<br>Greater than 100 dB at 60 Hz |
| Gain Control Range: | 120 dB minimum |
| Power Source: | 4 regular 1.5 volt "C" cells |
| Operating Temp. Range: | -10 to +55°C<br>(14 to 131°F) |
| Size: | 5.6 x 5.3 x 3.3 inches<br>(14.3 x 13.5 x 8.4 cm) |
| Weight: | 2.4 lbs. (1.09 kg) |

**PROBES**

| | |
|---|---|
| Ground Return Probe: | 7.5 lbs. (3.40 kg) |
| Snooper Probe: | 1.0 lbs. (0.45 kg) |
| Flexicoupler: | 0.5 lbs. (0.23 kg) |

## FACTORY SERVICE

The Rycom Model 8830 was designed for dependable operation without periodic adjustment and calibration. If, however, your 8830 is not working properly, return it to the factory for repair. Make sure the problem isn't bad batteries. Send it PREPAID to:

Rycom Instruments, Inc.
9351 E. 59th Street
Raytown, Missouri 64133 U.S.A.
Telephone: 816-353-2100
TWX: 910-771-2182
Answbk: "Rycominstr"

We will repair and ship back normally within 5 days any instrument sent in, unless the instrument is unrepairable. In this case, we will advise you.

If you need information, call the Rycom Factory Repair Department at 816-353-2100. If you return your 8830 for service or repair, be sure to include the following information:

1. Name and address of owner.

2. Brief description of symptoms or trouble.

3. If possible, send the name and telephone number of someone familiar with the problems who may be contacted if we need additional information.

4. Return shipping address and department mail address, if necessary, along with any special shipping instructions.

## PACKING INSTRUCTIONS

1. Use the original shipping carton/s or equivalent sturdy containers. Add packing material around all sides of the pieces shipped.

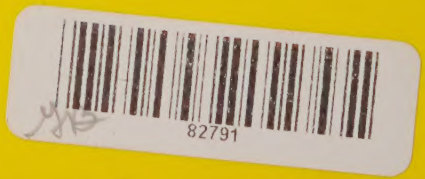
2. Seal the shipping container/s with strong tape.

3. Mark the shipping container/s to indicate that the contents are FRAGILE ELECTRONIC EQUIPMENT.

# MODEL 8830
# CABLE FAULT LOCATOR
# WARRANTY

This instrument is under warranty for one year from date of delivery against defects in material and workmanship (EXCEPTION — DRY BATTERIES). We will repair or replace products that prove to be defective during warranty period. No other warranty is expressed or implied. We are not liable for consequential damages.

RYCOM®
instruments, inc.
9351 E. 59th Street
Raytown, Mo. 64133 U.S.A.
Telephone: 816-353-2100
TWX: 910-771-2182
Answbk: "Rycominstr"




Part Number 030-00028-00

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